

Continuing Medical Implementation Inc.

*Bridging the Care Gap*



*Congestive  
Heart  
Failure*

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***SURVIVAL  
KIT***



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**Continuing Medical Implementation Inc.**

*Bridging the Care Gap*



## **CONTINUING MEDICAL IMPLEMENTATION**

### ***Mission statement:***

- ♥ *To optimize cardiovascular risk in all cardiovascular patients. To reduce the gap between evidence and implementation.*
- ♥ *To shorten the time lag between best evidence and implementation.*
- ♥ *To provide community based leadership in evidence based medicine dissemination and implementation.*
- ♥ *To provide physicians with patient education materials and patient management tools.*
- ♥ *To provide an integrated approach to the management of all aspects of cardiovascular disease.*



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## **I. INTRODUCTION**

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The purpose of this booklet is to provide you with information about congestive heart failure (CHF) also known as heart failure (HF). The development of heart disease is naturally accompanied by many fears. “Will I die?” “What about my job?” “My family still needs me. What will they do?” “Can I still be active?”

Congestive heart failure is a serious condition, which can carry a serious prognosis. However modern therapy has greatly reduced the mortality and danger of CHF and allowed many patients to return to a full and normal life. Learning about heart failure is the first step and we hope this booklet will be useful in helping you turn heart failure into heart success.

## II. THE HEART: WHAT IT DOES AND HOW IT WORKS

The heart is a hollow, muscular organ located between the lungs and underneath the breastbone. A muscular wall divides the heart into two sides: the right side and the left side. Each side has two chambers. The two upper chambers of the heart are called the atria. The lower chambers are called the ventricles (see figure 1).

The atria are the filling chambers. They receive blood returning from the body (right atrium) and the lungs (left atrium). The ventricles are the pumping chambers of the heart. The right ventricle pumps blood to the lungs. The left ventricle pumps blood to the rest of the body. The atria and the ventricles are separated by valves, which allow the blood to flow through the heart in one direction and prevent back flow of blood.

The wall of the heart is made up of three layers. The outer layer is called the epicardium. The middle layer is the actual heart muscle and is called the myocardium. The inner layer of the heart is called the endocardium. The heart is contained within a sac called the pericardium.

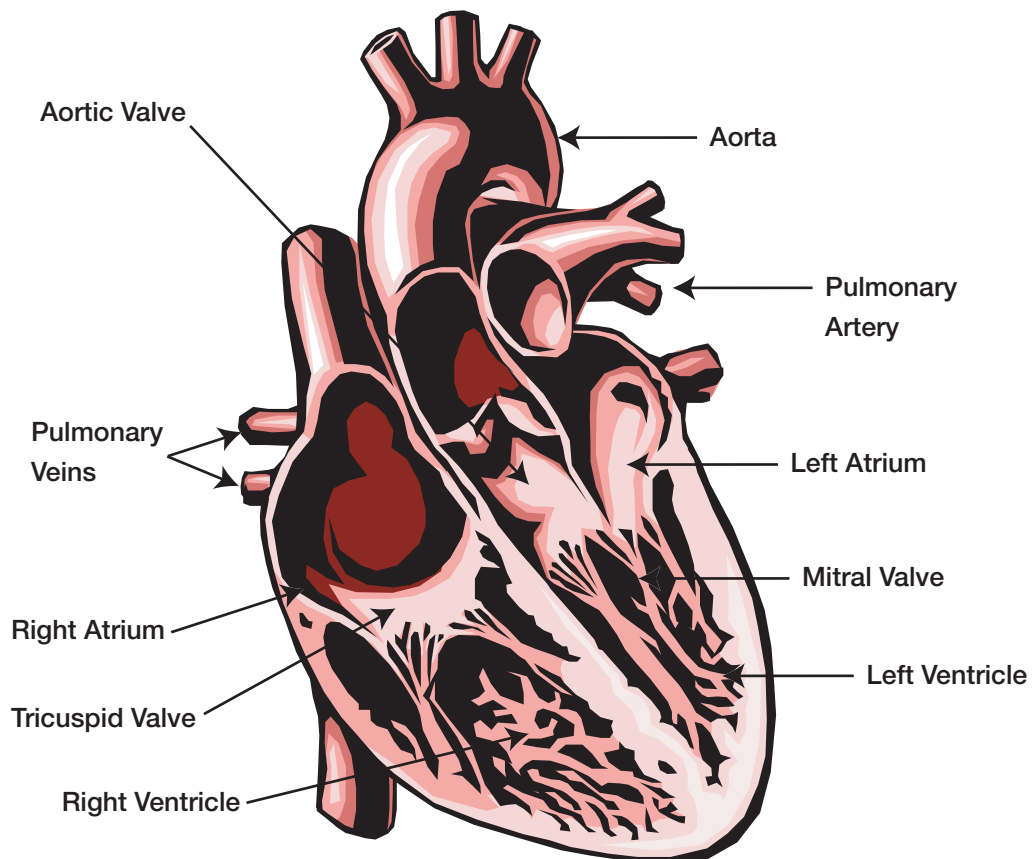
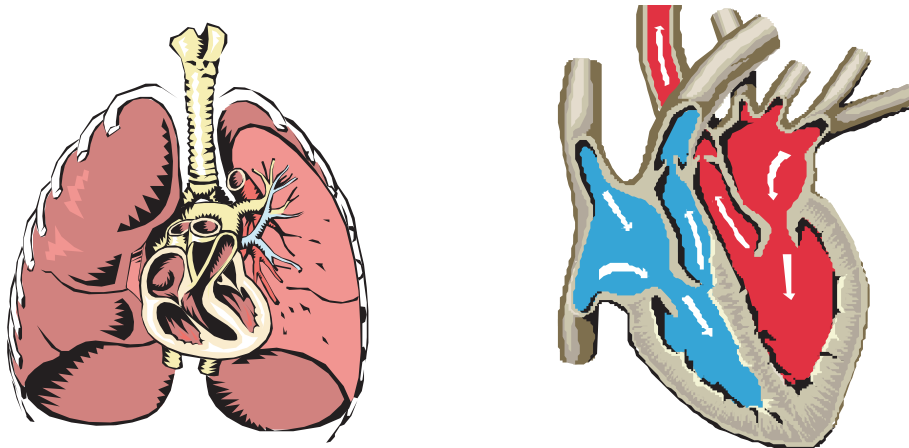


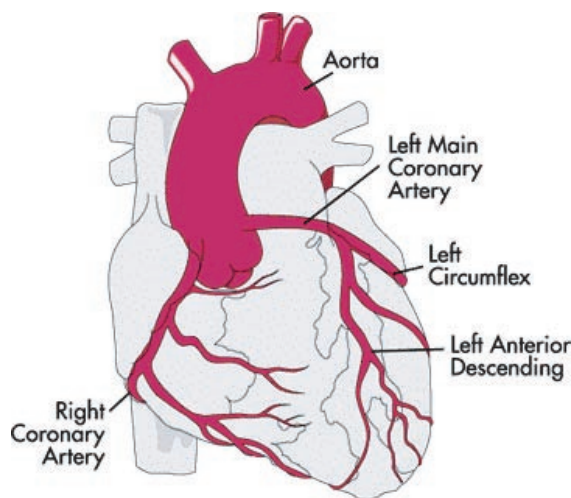
Figure 1.

The sole purpose of the heart is to pump blood to and from the rest of the body. The right side of the heart pumps blood without oxygen to the lungs where oxygen is picked up by the red blood cells. The blood then returns to the left side of the heart from where it is pumped to the organs and muscles of the body, including the heart itself. (Figure 2).



*Figure 2.*

In order to propel the blood, the heart must contract and relax some 60 to 100 times every minute. Exercise requires the heart to work harder. It does this by an increase in the heart rate and an increase in the amount of blood pumped from the heart with every heartbeat. In order for the heart muscle to continuously pump, it must be well supplied with oxygen-rich blood. The heart supplies itself with this blood first, before sending blood to the rest of the body. The heart muscle is supplied with blood through the coronary arteries, the heart's own blood vessels (See Figure 3 for a picture of the right and left coronary arteries and how they supply the heart with blood).



*Figure 3.*

### **III. CONGESTIVE HEART FAILURE**

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#### **What is congestive heart failure?**

Congestive heart failure (CHF) is a term used to describe the heart's inability to pump enough blood to meet the body's needs. Heart failure does not mean that the heart has failed completely, but rather that the heart is not strong enough to meet the body's needs at times of stress or increased activity. As you have learned the left ventricle normally receives blood from the lungs and pumps blood through the arteries to the brain, internal organs and extremities.

The left ventricle is the most important pumping chamber. It normally pumps 60% of its volume with each beat. This number is called the ejection fraction or **EF**. The **EF** is a very important predictor of prognosis in heart failure and can be measured by a number of tests (see Cardiac Investigations in Heart Failure).

When the left ventricle is weak the patient may experience symptoms of low cardiac output: fatigue and dizziness, and symptoms of congestion: shortness of breath on exertion, inability to lay flat and awakening at night-time with shortness of breath. If the CHF becomes severe fluid may leak into the lungs causing "pulmonary edema" and severe respiratory (breathing) difficulties.

When the right ventricle fails, the patient may also have symptoms of low cardiac output but also experience fluid build-up in the tissues of the body resulting in leg swelling (edema) and congestion of the internal organs.

#### **Causes of CHF**

Weakness of the left ventricle can be caused by:

- Longstanding uncontrolled hypertension
- Heart attacks - damage to the heart muscle due to coronary artery disease (blocked arteries)
- Valvular heart disease- longstanding leaking or narrowing of the aortic or mitral valves
- Viral, toxic or metabolic disturbances damaging the heart muscle. Alcohol is the most common culprit.
- Longstanding rapid heart beating (racing) due to some form of arrhythmia
- Congenital abnormalities e.g. ventricular septal defect (a hole between the left and right ventricles)



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Weakness of the right ventricle may be caused by:

- Failure of the left ventricle
- High blood pressure within the lungs
- Valvular heart disease-pulmonary valve stenosis (narrowing), tricuspid valve leaking
- Right ventricular infarction (heart attack) due to coronary artery disease
- Congenital abnormalities e.g. atrial septal defect (a hole between the left and right atria)
- Disease affecting the sac surrounding the heart (the pericardium) such as fluid accumulation (effusion) or abnormal thickening (constriction)

### **Is CHF dangerous?**

Untreated CHF can lead to severe respiratory difficulties which can be life threatening. Fortunately there are many medications, which are effective in treating the symptoms and improving the prognosis of CHF. Lifestyle modifications including proper diet, rest and exercise as well as salt restriction can help reduce or eliminate the symptoms of CHF.

Heart failure is not a static condition and may deteriorate gradually or suddenly. It is important for you to recognize the symptoms of heart failure and to alert your physician to any deterioration in your condition. If you act early on, severe heart failure and the need for hospitalization may be avoided.

### **Triggers of worsening Heart Failure**

Sudden worsening of HF may be due to:

- Lack of blood supply to the heart (ischaemia)
- Cardiac arrhythmia
- Pneumonia
- Blood clots
- Acute valvular pathology (leaking valves due to infection, trauma, ischaemia)

Gradual worsening of HF may be caused by:

- Anemia
- Hyperthyroidism
- Dietary non-compliance (not eating properly-eating too much salt or salty foods)
- Medication non-compliance (not taking your pills regularly or properly)
- Various medications such as anti-inflammatory medications for arthritis which can cause fluid retention

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### Summary of Heart Failure Symptoms:

- Increasing shortness of breath
- Inability to lie flat in bed at night
- Waking from sleep short of breath
- Increasing shortness of breath with activity
- Increasing fatigue and dizziness
- Swelling of the extremities

*If you experience sudden severe shortness of breath, this is a medical emergency and you should call an ambulance or proceed directly to the closest hospital.*

## IV. OTHER SYMPTOMS OF HEART DISEASE

In addition to heart failure symptoms, you should be aware of other symptoms of heart disease that may occur in patients with heart failure. There are three symptoms of heart disease, which will be described below.

### Angina

Angina pectoris is a symptom that occurs when blood supply to an area of the heart muscle doesn't meet its needs. Angina may be felt as heaviness below the breast bone which may spread to either arm, to the neck or the back. On occasion, angina may be an indigestion-like discomfort in the upper stomach or a burning or heartburn-like feeling below the breastbone. Angina may occur during physical activity, at rest or it may awaken you when you are asleep. Angina that becomes more frequent or severe, or that occurs at rest and lasts for longer periods of time, is of great concern. This change in pattern of angina is known as **UNSTABLE ANGINA** and may be an early warning sign of a heart attack. When angina lasts longer than 20 minutes, there is a risk that heart damage has occurred. If this occurs, you should call your doctor or have someone take you to the nearest hospital's Emergency Department.

### Myocardial Infarction (Heart Attack)

Myocardial infarction is the medical term for a heart attack. It has also been known as coronary thrombosis or simply as a "coronary". It is caused by blockage of the coronary arteries from cholesterol plaque and blood clots (Coronary Artery Disease - CAD). Coronary artery disease is one of the most common causes of congestive heart failure. Some patients experience congestive heart failure as a complication of a heart attack. In some patients congestive heart failure may be the first or only sign of CAD. The pain of myocardial infarction lasts longer than that of angina pectoris. Generally there is a prolonged, sudden-crushing chest pain accompanied by shortness of breath, sweating, nausea, vomiting and perhaps lightheadedness. This pain may spread to the arms, neck, jaw, shoulders and back.

For some people symptoms of angina and heart attack may be felt only as shortness of breath. For others, heart attacks may occur silently without any symptoms of chest pain or they may be passed off as mild indigestion.

### Arrhythmia

The heart normally beats anywhere from 60 to 100 times a minute. Pacemaker tissues in the right atrium or filling chamber regulate the heartbeat. The main pacemaker of the heart is known as the sinus node and when it is working properly the heart rate is said

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to be in normal sinus rhythm. Any disturbance of this normal sinus rhythm is known as an arrhythmia. The heart may beat slowly or rapidly but still be under the control of the sinus node. Such conditions may be normal such as during sleep or exercise.

Extra or early beats may occur and are normal. These may be experienced as skips, palpitation or extra beats. When several of these occur together, they may be experienced as flip-flopping of the heart or a short palpitation. These arrhythmias are harmless. When an arrhythmia becomes continuous, they may be experienced as a racing sensation of the heart and may be accompanied by light-headedness, dizziness or fainting. Arrhythmias may arise from the upper (filling) chambers of the heart or lower (pumping) chambers of the heart.

Not all arrhythmias are dangerous; most are not, but some may be potentially life threatening. If you experience these sensations, you should tell your doctor.

## V. LIFESTYLE MODIFICATIONS IN HF

It is important for patients with heart failure to adhere to certain lifestyle modifications that may improve their general well being. As well by controlling certain diseases, which contribute to HF, both symptoms and prognosis can be improved. These include:

### 1. Low salt diet – see no sodium diet (*appendix a*).

General guidelines:

- Prepare and cook all food without salt. Use herbs and spices to flavor foods.
- Do not add salt at the table.
- Avoid salty foods such as snack foods, convenience foods, and fast foods.
- Salt substitutes may be used. Check with your physician.
- Some medications, such as laxatives and antacids, contain sodium. Check with your physician or pharmacist.
- Read labels on packaged foods carefully. Foods listing salt or sodium at the beginning of the ingredient list are high in salt. Some labels use the symbol “Na” for sodium.

### 2. Regular exercise/activity -see Exercise and Heart Disease below and exercise Rx (*appendix b*).

### 3. Smoking cessation – see The Guide For Cardiac Rehabilitation and Prevention.

### 4. Treat and control high blood pressure – see The Guide For Cardiac Rehabilitation and Prevention.

### 6. Treat and control diabetes– see The Guide For Cardiac Rehabilitation and Prevention.

### 7. Identify and treat depression.

## VI. EXERCISE AND HEART DISEASE

Exercise not only helps fight heart disease, but for sedentary people, just adding a little exercise to your daily routine reduces the risk of high blood pressure, osteoporosis, breast and colon cancer, depression, anxiety and stress. Ideally, you should exercise three to five times a week for 20-50 minutes within your target heart rate. However, your health can benefit simply by accumulating 30 minutes of moderate activity per day, such as stair climbing, walking to work, or gardening. Also it is not just aerobic exercise such as walking, cycling, jogging and swimming that is recommended. Resistance/strength training (light weight lifting), and interval training are important components of a good fitness program because they increases your strength and stamina, lead to decreased body fat and help improve blood cholesterol levels. This type of exercise is best individualized and initiated under controlled settings where facilities are available. For deconditioned or heart failure patients briefer periods of supervised exercise may be carried out 2-4 times per day initially with gradual increase in duration.

### Benefits of Regular Exercise

- Improves heart and lungs
- Decreases resting blood pressure
- Decreases body fat
- Decreases total and LDL cholesterol (“bad cholesterol”)
- Raises HDL cholesterol (“good cholesterol”)
- Increases energy level
- Increases tolerance to stress and depression
- Controls or prevents the development of diabetes
- Decreases risk of orthopedic injury

### Guidelines for Safe Exercise

- Frequency - 3-5 times a week
- Duration - 20-60 minutes
- Intensity (how hard) - within your target heart rate

### Calculating Your Target Heart Rate

- 1)  $220 - \text{age} = \text{MHR}$  (maximum heart rate)
- 2)  $\text{MHR} \times 0.8 = \text{HR}$  (this is the upper end of your target HR)
- 3)  $\text{MHR} \times 0.7 = \text{HR}$  (this is the mid range of your target HR)
- 4)  $\text{MHR} \times 0.6 = \text{HR}$  (this is the low end of your target HR)
- 5)  $\text{MHR} \times 0.5 = \text{HR}$  (low end target HR for Heart Failure patients)

For patients with ischaemia and/or exercise induced arrhythmia, set exercise HR in a 10-15 beat range, 10 beats below the onset of ischaemia and/or arrhythmia. Initiate exercise at 60% of maximum predicted HR (MPHR) and progress to 70-80 % of maximum HR. For Heart Failure patients, initiate at 50% MPHR and progress to 60-70 % MPHR.

## VII. CARDIAC RISK FACTORS

Cardiac risk factors can contribute to the development of CAD (coronary artery disease) and CHF. Let's look at the risk factors – things about you and how you live that can increase the possibility of a heart attack. Some risk factors cannot be changed (not modifiable) and some can be eliminated or greatly reduced by changing your habits and the way you live (modifiable).

Not Modifiable	Modifiable	Non-Traditional
<ul style="list-style-type: none"><li>• Family History</li><li>• Gender</li><li>• Age</li></ul>	<ul style="list-style-type: none"><li>• Hypertension</li><li>• Diabetes</li><li>• High Cholesterol</li><li>• Smoking</li><li>• Obesity</li><li>• Inactivity</li><li>• Stress</li></ul>	<ul style="list-style-type: none"><li>• Lp (a)</li><li>• Homocysteine</li><li>• Fibrinogen</li><li>• Hypercoagulable States</li><li>• Inflammatory Conditions</li><li>• Increased Clotting Factor VII</li><li>• CRP</li></ul>

### Summary of Cardiac Risk Factors

- Know your blood pressure and seek treatment if it is high.
- If you are a diabetic, strive to maintain a normal blood sugar.
- Reduce fats and cholesterol in your diet.
- Quit smoking.
- With your physician, plan a regular program of physical activity.
- Attain and maintain your ideal weight.
- Learn stress management or relaxation techniques.

For a more detailed review of cardiac risk factors please see ***The Guide For Cardiac Rehabilitation and Prevention.***

## **VIII. CARDIAC INVESTIGATIONS IN HEART FAILURE**

### **Non-Invasive Cardiac Investigations and Procedures**

#### **Echo/Doppler**

Echocardiography is an ultrasound test that gives excellent pictures of the structures of the heart. It evaluates the size, shape and motion of these structures. Important information may be obtained on the function of the pumping chambers of the heart and of the valves. This test is entirely painless and safe. It takes about 15 to 30 minutes; Cardiac Doppler is also an ultrasound test. It too is painless and safe. It may be used to find leaky cardiac valves and/or the presence of tightened or stenotic valves. The test takes about 10 to 20 minutes. In both tests a transducer (a small instrument looking something like a stethoscope) coated with conductive jelly will be placed on the chest and moved along the chest wall over the areas to be examined.

#### **Trans-esophageal Echocardiography (TEE)**

In some patients in whom external or trans-thoracic echocardiography does not provide diagnostic information, an ultrasound transducer can be placed into the esophagus to provide close and excellent pictures of the cardiac structures. Such a procedure is much like a gastroscopy and is usually carried out under sedation.

#### **Stress Testing**

Stress testing is also known as treadmill testing or graded exercise testing. During the test you will be asked to walk on a treadmill which gradually increases the speed and grade. Your electrocardiogram, blood pressure and symptoms will be continuously monitored. The test will be stopped when your symptoms warrant it or if a strongly positive result or arrhythmia occurs. Treadmill testing is useful to assess the presence and severity of coronary artery disease, and if present to determine the prognosis and to guide therapy or intervention.

A treadmill test may be carried out shortly after a heart attack to determine your risk for a future heart attack or for angina. The most common way to do this is to increase speed and grade every 3 minutes. In this case, the treadmill test is usually limited either by a time or a heart rate maximum. Later a full exercise test may be carried out.

Treadmill testing may show changes in the electrocardiogram (ECG) which may mean the blood supply to your heart is reduced. Chest pain or shortness of breath may accompany these changes. Unfortunately treadmill testing is not perfect. About 30% of the time false positive results may be obtained. This may make further testing necessary to rule out coronary disease or assess its severity.



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## Holter Monitoring

A Holter monitor is a tape recorder, which is attached to your skin by ECG electrodes. It is able to record the heart rhythm over a 24-hour period. You will record any symptoms that occur during that time. The recording is then analyzed. It may detect changes in heart rhythm, or changes in the ECG that might mean lack of blood supply to the heart.

## Stress Nuclear Testing

Stress Thallium testing is a form of a treadmill test that may provide added useful information about your prognosis. A nuclear material is injected into your blood stream while you exercise on the treadmill. The material is safe and medically approved. Similar nuclear materials are used to obtain bone scans, brain scans, thyroid scans etc. The nuclear material is taken up by your heart and is distributed through the heart muscle according to blood flow. Areas of the heart that are supplied by narrowed arteries will have reduced blood flow that will show up on scanning as reduced areas of radioactivity. These techniques are more accurate than routine treadmill testing in finding coronary disease and determining its severity. Scanning agents include **Thallium** and **Sestamibi (MIBI)**. MIBI scanning has the added advantage of providing information on the pump function of the heart. Both stress and persantine thallium and sestamibi stress tests are useful in excluding falsely abnormal treadmill stress tests and carry 90-95% accuracy.

## Gated Nuclear Angiogram (Wall Motion Study)

A gated nuclear angiogram (nuclear wall motion study, radionuclide angiogram, MUGA scan) is a technique using radioisotopes to measure the pump function of the heart. This technique is used to measure the function of the left ventricle (LV), which is the major pumping chamber of the heart. A gated nuclear angiogram is more accurate than echocardiography and even cardiac catheterization in measuring the pumping capacity of the left ventricle. The nuclear angiogram is the best way to measure the ejection fraction or **EF** of the heart. This is the percentage of the heart's internal blood volume that is ejected with every beat. A normal ejection fraction is > 55%. An EF of 40-55% is considered mild LV (left ventricular) dysfunction. An EF of 30-40% is considered moderate LV (left ventricular) dysfunction. An EF of < 30% is considered severe LV (left ventricular) dysfunction. The EF is a very important measurement and is one of the best prognostic indicators we have in assessing heart disease.

If localized areas of the heart do not contract normally, these "regional wall motion" abnormalities usually indicate damaged heart muscle from coronary artery disease. If there is generalized weakness of the heart muscle, other conditions such as hypertensive heart disease, valvular heart disease, or cardiomyopathy (Greek for "sick heart") may be present. A Gated Nuclear Angiogram is a medically safe and approved test that helps your physician to properly assess your heart's pumping function.

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## **BNP**

BNP (b-type natriuretic peptide) is a hormone secreted from the cardiac pumping chambers in response to fluid and pressure overload. The function of the hormone is to promote salt excretion by the kidney. BNP levels are elevated in patients with decompensated heart failure. Elevated levels of BNP correlate with prognosis and severity of symptoms of heart failure. Rapid assays of BNP are becoming available which will permit rapid diagnosis of heart failure in the emergency department of office. It is sometimes difficult to separate the symptoms of heart failure from other causes of shortness of breath such as acute and chronic lung disease. BNP levels of 100 pg/ml or less have a high negative predictive value for heart failure. Most patient with symptomatic heart failure have BNP levels > 400 pg/mL. Intermediate values may be found in patients with LV dysfunction (weakened pumping chambers) without frank heart failure. Increased availability of BNP may provide physicians with a tool to track optimal heart failure therapy.

## **Invasive Cardiac Investigations and Procedures**

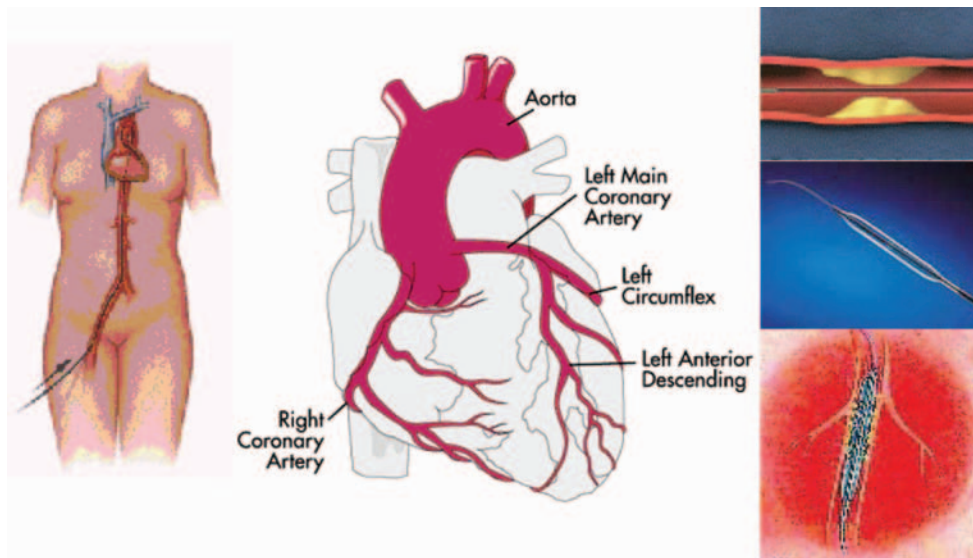
### **Cardiac Catheterization (coronary angiogram or simply “angiogram”)**

Cardiac catheterization is a procedure where a small plastic catheter is placed within a large artery in your leg and advanced to your heart. This technique is used to take pictures of the arteries of the heart and the pump function of the left ventricle. The procedure provides the most detailed and accurate information on the anatomy of the coronary arteries. Cardiac catheterization is necessary before a decision can be made about bypass surgery or coronary angioplasty. On occasion, for instance, when the arteries to the legs are blocked, the procedure is carried out through an artery in the elbow crease or wrist.

This procedure is called an “invasive cardiac procedure” because tubes are actually placed within the body. The procedure is, however, relatively painless. Local anaesthetic is given before insertion of the catheters. You may feel pressure as the catheter is inserted. You may feel a warm sensation throughout your body when the x-ray dye is injected to obtain the pictures. The procedure generally lasts for one-half hour. After the procedure you will be asked to lie still for six hours to allow the puncture site in the groin to heal.

There are certain risks involved in cardiac catheterization. These include an approximate 2/1000 risk of serious complications such as heart attack or stroke. As well there is a 2/100 risk of minor complication such as allergy, bleeding or fainting. Ninety-eight times out of a hundred there are no problems.

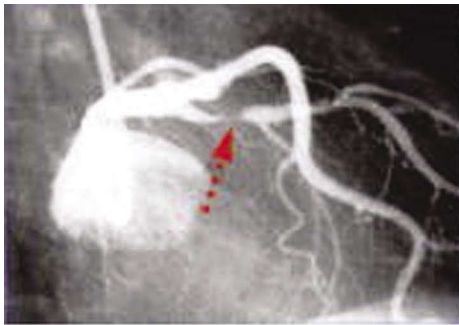
Cardiac catheterization is not indicated in all patients with coronary artery disease. In general, it is reserved for patients whose angina is unstable, in patients who are having angina following a heart attack, or in whom other cardiac testing has shown a risk for myocardial infarction.



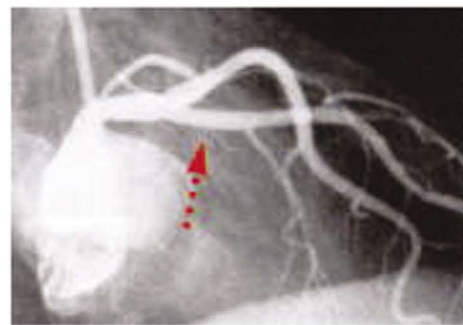
### Coronary Angioplasty (PTCA)

Coronary angioplasty is a technique used to open up narrowed or blocked coronary arteries. It is carried out in a manner similar to cardiac catheterization. Plastic tubes are inserted through a large artery in your leg and advanced to the opening of the coronary arteries. Small balloons are then placed through these small plastic tubes (catheters) and slid down the coronary arteries to the level of narrowing. These balloons are inflated at the site of coronary narrowing, resulting in compression or flattening outwards of the cholesterol plaque and blood clotting substances that make up the blockage.

Angioplasty has a high success rate of around 90%. Unfortunately, however, the narrowing may recur 30% of the time. It is possible to do second and third coronary angioplasties if necessary. Coronary angioplasty carries the same risks as cardiac catheterization. In addition, there is a slightly higher risk of myocardial infarction (heart attack) as the angioplasty may sometimes cause blockage of coronary arteries that are being opened. This risk is still low. In most cases a STENT or expandable basket is placed within the coronary artery. This improves the long-term success of the angioplasty and stenting procedure.



*LAD Stenosis Pre-angioplasty*



*LAD Stenosis Post-angioplasty*

### **Cardiac Resynchronization Therapy**

The normal heart beats in sequence from the upper chambers (atria or filling chambers) to the lower chambers (ventricles or pumping chambers). Normally the ventricles beat in synchrony, that is, at the same time. By doing so, maximum force is generated to push blood from the right ventricle to the lungs and from the left ventricle to the body. In some patients with heart failure, electrical activity is delayed within the left ventricle. This creates a loss of synchrony. The ventricles are not beating together and their pumping efficiency is reduced.

Cardiac Resynchronization Therapy uses a special pacemaker to restore cardiac synchrony. Electrical leads are placed both within the right ventricle (the usual site of a ventricular pacemaker lead) and the left ventricle via one of the coronary veins. Electrical impulses are delivered to both ventricles simultaneously thus restoring cardiac synchrony, improving cardiac output and reducing symptoms of congestion and low cardiac output.

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Cardiac Resynchronization Therapy is not appropriate for all patients with heart failure. Patients who benefit the most are those with moderate to severe symptoms despite optimal medical therapy (NYHA Class III-IV), reduced ejection fractions (LVEF < 35%), delayed electrical activation of the left ventricle evidenced by a widened electrical QRS complex on ECG (QRS duration 0.12-0.14 seconds or greater with a pattern of IVCD or LBBB) or patients who already have a pacemaker implanted in the right ventricle to guard against bradycardia (excessive slowing of the heart).

### **Implantable Defibrillator (AICD)**

Implantable defibrillators or automatic, implantable cardioverter-defibrillators are complex electrical devices designed to monitor the heart's rhythm and deliver lifesaving electrical therapy should the patient suffer a life-threatening arrhythmia. Patients with weakened hearts from whatever cause are at increased risk for cardiac rhythm disturbances or arrhythmias. These may be symptomatic or asymptomatic. Arrhythmias from the lower chamber or ventricle may be intermittent or continuous, regular or irregular. Some of these can be life-threatening. The most dangerous are sustained ventricular tachycardia (VT), a fast continuous rhythm coming from the ventricle (usually left ventricle) and ventricular fibrillation (VFIB), a totally irregular and erratic rhythm. In ventricular tachycardia the patient may remain conscious and experience mild to severe symptoms of dizziness, shortness of breath or chest pain. If the VT is sufficiently fast the patient may lose consciousness. In ventricular fibrillation the ventricles do not pump blood effectively and loss of consciousness occurs. Unless resuscitative measures are applied promptly, the patient will not survive.

An AICD is inserted like a pacemaker with an electrical lead implanted into the right ventricle of the heart via the large veins leading from the arm to the heart. The device is implanted under the skin below the collarbone and is about the size of a large pacemaker. The circuitry of the AICD continuously monitors the heart's rhythm. If a patient develops an excessively fast pulse the AICD delivers an internal shock designed to restore normal rhythm. The AICD continues to monitor and may deliver multiple shocks if the first ones are ineffective. AICDs also have backup pacing capability to deal with excessively slow heart rates. Some AICDs also have leads implanted into the right atrium or left ventricle to provide dual chamber pacing and/or resynchronization therapy.

AICDs are not indicated for all patients with heart failure. Indications for AICDs include patient with symptomatic sustained or non-sustained VT and patients with recurrent VFIB. It has been shown that AICDs may be of benefit in patients without symptomatic ventricular arrhythmia. Selection criteria in these cases include patients with weakened left ventricles (LVEF  $\leq$  30%) who also have a widened QRS complex (IVCD) usually greater than 0.15 seconds.

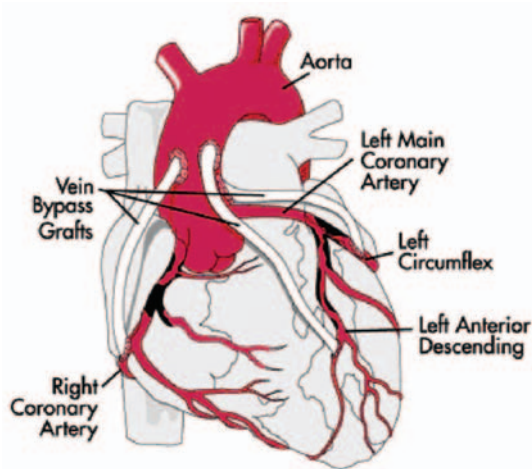
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## Coronary Artery Bypass Grafting (CABG)

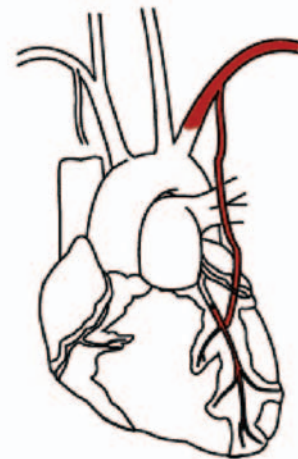
Coronary artery bypass grafting (CABG) is a surgical technique whereby veins are taken from the legs and an artery is taken from the chest wall. They are used to bridge or bypass narrowed areas in coronary arteries to restore blood flow to the heart. Newer procedures include total arterial revascularization: where arteries from the right and left chest wall, and from the forearm are used to create all the bypass grafts, and the MID-CAB procedure where bypass of single vessel LAD disease is carried out on the beating heart through a small incision in the anterior chest wall. These newer procedures have specific indications, which can be discussed with your cardiac surgeon

CABG is very good therapy for angina particularly when medications or angioplasty cannot control angina. The surgery may also be indicated where cardiac testing shows a high risk for extensive heart damage to occur if the patient were to suffer a heart attack.

The operation usually takes about 4 hours and the patient is usually in hospital about 5–7 days. The patient usually resumes normal activities by around 2 months after the surgery and may return to work in 3–4 months. The risk of bypass surgery includes an approximate 1% risk of death and 5% risk of heart attack, stroke or wound infection.



*Multiple Coronary Artery  
Bypass Vein Grafts*



*Left Internal Thoracic (Mammary)  
Artery to Left Anterior Descending  
Coronary Artery Graft*

## **IX. MANAGEMENT OF HF WITH MEDICATIONS**

Medications are one important part of heart failure management. Proper use of medications may benefit you in two ways:

1. By improving your **symptoms** (the way you feel)
2. By improving your **prognosis** (improving the pump function of the heart, reducing dangerous rhythm disturbances, preserving your heart muscle and helping you to live longer).

Your physician will determine the strength of the medications (dose) and the number of times it is taken (frequency) according to your particular needs. Your needs will be different from another person's needs.

**It is very important that you take your medication as prescribed.**

**If you have problems or side effects of your medication – alert your physician.**

**If you do not understand your medication – alert your physician.**

Most cardiac medications have two names, which causes some confusion. There are BRAND names, which may be given to the same medication by several different companies. In addition, there is the GENERIC name, which is the same name for the same medication manufactured by different companies. Pharmacies are permitted and expected to substitute less expensive generic medications for brand name medications unless otherwise specified by the physician. The active ingredients in these medications are generally the same, although other constituents may vary. In the following discussion, brand names will be listed in brackets.

### **A note re: dosing frequency**

Certain medical abbreviations are used in the tables below to indicate dosing frequency. These include:

- EOD – every other day
- OD – once a day
- BID – twice a day
- TID – three times a day
- QID – four times a day

## Medications to Improve Symptoms

### 1. Diuretics

Diuretics are sometimes called water pills or fluid pills. Diuretics are medications, which help your kidneys to clear your body of excess fluid. This means that you make more urine and have to urinate more often. Diuretics are used in conditions such as congestive heart failure and also in high blood pressure. They help the heart as it then has less fluid to pump. Diuretics may make you thirsty, but when taking a diuretic, you should avoid drinking unusually large amounts of liquids as this can counter the effect of the diuretic and lead to dilution of the body's natural salts.

Generic Name	Brand Name	Dosing Frequency	Dosing Range (mg)
Loop diuretics-very potent diuretics used primarily for CHF			
Furosemide	Lasix	OD-BID-TID	20-40-80-120
Ethacrynic acid	Edecrin	OD-BID	50-100
Thiazide diuretics-less potent diuretics sometimes used in combination with loop diuretic – * usually intermittently i.e. 2-3 X /week or every 2nd day depending on symptoms, weight and swelling- see appendix d) How to adjust your diuretic dose			
Hydrochlorthiazide	Hydrodiuril, Esidrix	Intermittently	12.5-25
Indapamide	Lozide	Intermittently	1.25-5.0
Metalozone	Zaroxolyn	Intermittently	2.5-5.0
Potassium sparing diuretics - usually used in combination with other diuretics.			
Spironolactone <sup>§</sup>	Aldactone	EOD to BID	12.5-25
Triamterene	Dyrenium	Intermittently*	50
Amiloride	Midamor	Intermittently	* 5
Combination diuretics			
Hydrochlorthiazide/ triamterene	Dyazide	Qw - 1 tablet intermittently*	
Hydrochlorthiazide/ amiloride	Moduret	Qw tablet intermittently*	
Hydrochlorthiazide/ spironolactone	Aldactazide 25	Qw - 1 tablet intermittently*	

<sup>§</sup> Spironolactone has been shown to improve prognosis in patients with CHF



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### **Common Names and Doses Of Diuretics (see OPOT Guidelines )**

Diuretics may also result in a loss of potassium, which should be replaced by including potassium rich foods in your diet. Bananas and citrus fruits are rich in potassium, as are raisins, dates and green leafy vegetables (**see high potassium diet appendix c**). Your doctor may also prescribe a potassium supplement in form of liquid or tablet. If you are taking a potassium sparing diuretic, a potassium supplement is usually NOT needed.

Many patients with CHF only require a small dose of diuretic. Some patients require combination diuretics and higher doses of diuretics to control congestion. Diuretics may make you feel thirsty but you should avoid drinking too much fluid. This would dilute the salts in your bloodstream and counter the benefit of the diuretic. Avoidance of salt is necessary, as salt in your diet leads to fluid retention. (**see No Sodium Diet - appendix a and appendix d How To Adjust Your diuretic for guidance**).

### **2. Digoxin (Lanoxin)**

Digoxin is a drug that acts to strengthen your heart contractions. It also regulates heart rhythm and is used to control heart rate in certain types of arrhythmia. If taken in excess, Digoxin may cause excessive slowing of heart rate. You should count your heart rate before taking this medication. If your heart rate is below 60, only take half the dose. If your heart rate is below 50, do not take your digoxin and alert your health care provider.

Symptoms of Digoxin excess include:

- loss of appetite, nausea or vomiting
- palpitations,
- visual disturbance (blurring, yellow or green tinge),
- increased shortness of breath, increased fatigue or swelling of ankles
- sudden weight gain of more than three pounds.

If these symptoms occur, contact your physician. Take this medication at a regular time each day. Take a missed dose within 12 hours, but do not take a double dose to make up for a missed one. Report a very high, low or irregular heart rate to your doctor.

### **Medications to Improve Prognosis (Outcome)**

#### **1. Angiotensin Converting Enzyme Inhibitors (ACE-inhibitors)**

Vasodilators are medications which open blood vessels, either arteries or veins, and in doing so, relieve congestion and the workload of the heart. ACE inhibitors are members of a special group of vasodilators known as ACE Inhibitors. These agents block the conversion of angiotensin I to angiotensin II. Intrinsic (natural) substance that causes constriction of blood vessels and can lead to fluid retention. In addition to their use in the treatment of hypertension and congestive heart failure, these agents have been shown to reduce hospitalization and improve prognosis in many patients.

## Currently Available Ace Inhibitors

Generic Name	Brand Name	Dosing Frequency	Dosing Range (mg)
Captopril	(Capoten)	Three times a day	6.25-50 mg
Enalapril	(Vasotec)	Two times a day	2.5-10 mg
Lisinopril	(Prinivil, Zestril)	Once a day	10-40 mg
Ramipril	(Altace)	Once a day	2.5-10 mg
Quinapril	(Accupril)	Once a day	10-40 mg
Fosinopril	(Monopril)	Once a day	5 mg-40 mg
Cilazapril	(Inhibace)	Once a day	0.5-10 mg
Trandolapril	(Mavik)	Once a day	0.5-4 mg

The major side effect of ACE inhibitors is a dry non-productive cough. Sometimes these agents can cause swelling of the throat and if this occurs, stop the medication and contact your physician. As these medications lower blood pressure (BP), dizziness can occur. If this happens, contact your physician.

In general the dose of these medications should be increased to the maximum tolerated dose for best improvement in outcome. Sometimes the dose will be limited by worsening of kidney function, as measured in a blood test (serum creatinine). Your doctor should monitor kidney function and potassium levels when you are on these medications.

## 2. Angiotensin II Receptor Blockers (ARB's)

These agents act further down the “angiotensin” pathway, than the ACE inhibitors, and block the effects of angiotensin II on the cells of the blood vessel wall. These agents are used in hypertension. Studies are underway on their use in heart attack patients and patients with congestive heart failure. ARB's tend to have fewer side effects than ACE inhibitors in terms of cough. They are equally effective in terms of blood pressure control and symptom control in CHF and may be as effective as ACE inhibitors in improving outcomes in CHF. Further studies in this area are underway.

## Currently Available ARB's

Generic Name	Brand Name	Dosing Frequency	Dosing Range (mg)
Losartan	(Cozaar)	Once a day	50-100 mg
Valsartan	(Diovan)	Once a day	80-160 mg
Candesartan	(Atacand)	Once a day	8-32 mg
Irbesartan	(Avapro)	Once a day	150-300 mg
Telmisartan	(Micardis)	Once a day	20-80 mg
Eposartan	(Teveten)	Once a day	300-600 mg

### 3. Nitrates and Hydralazine

Long acting nitrates are vasodilators, that dilate the venous system in the body, thus relieving congestion in the lungs by reducing the return of blood to the heart. These medications are also used to treat angina (pain from the heart due to lack of blood supply). Hydralazine is a blood pressure pill that acts directly on arteries thus lowering the blood pressure and reducing the work of the heart.

In patients who cannot tolerate ACE inhibitors, the combination of isosorbide dinitrate, a long acting nitrate, and hydralazine, has been shown to reduce cardiac mortality. There is no evidence on either agent used alone being of benefit in terms of outcome but nitrates are often used to treat angina in patients with CHF and coronary artery disease.

Side effects include of long acting nitrates include headache and lightheadedness. These side effects generally wear off. If they do not, notify your physician. When taking Nitrates, avoid overly hot showers and baths as they may make you dizzy and fainting is possible. To prevent dizziness, get up slowly from a sitting or lying position.

Hydralazine may cause dizziness if blood pressure is lowered excessively. In addition, in high doses over a prolonged period, hydralazine may cause Lupus, an arthritis like condition. It is important to report as soon as possible any rash, swelling of the face or neck, difficulty breathing or swallowing.

Generic Name	Brand Name	Dosing Frequency	Dosing Range (mg)
Hydralazine	Apresoline	Four times a day	10 mg-75 mg
Long acting nitrates			
Isosorbide dinitrate	Isordil	Four times a day	5mg-40 mg
Other forms of nitrates have not been tested in heart failure but may be useful to improve symptoms such as shortness of breath or angina.			

### 4. Beta-Blockers

Beta-blockers are medications that counter-act the bad effects of adrenalin and other adrenalin-like compounds on the heart. In patients with CHF, there is an excess of circulating adrenalin and other adrenalin-like compounds in the bloodstream. These compounds help support the failing heart, but in the long run can be toxic to heart muscle. Recent studies have shown that when beta-blockers are given to patients with heart failure their symptoms and heart function improve. Importantly there is also an improvement in survival.

Beta-blockers must be started in low dose and the dosage is gradually increased. Initially symptoms may worsen and patients must be monitored closely. It may be necessary to increase the dose of diuretic or ACE inhibitor, or to reduce the dose of beta-blocker in the short term, in order to control worsening symptoms such as increasing shortness of breath or

dizziness. One of the major side effects of beta-blockers is excessive slowing of the heart rate. If your heart rate is below 50, do not take your beta-blockers and alert your health care provider. In general, the highest tolerated dose of beta-blocker should be given to patients with CHF. Beta-blockers can also lower your blood pressure, reduce the frequency of angina attacks, control rapid heart rate and reduce the risk of complications after a heart attack by making the heart's workload easier.

Beta-blockers may have side effects, which include fatigue, difficulty concentrating, insomnia, nightmares, impotence and alterations of peripheral circulation. **Beta-blockers may also worsen asthma** and you should not be taking these drugs if you have this condition. Despite this list of side effects, most patients tolerate Beta-blockers without significant problems when the doses are adjusted slowly and carefully.

#### Names of Beta-blockers proven in heart failure

Generic Name	Brand Name	Dosing Frequency	Dosing Range (mg)
Bisoprolol	Monacor	Once a day	1.25 –10 mg
Carvedilol	Coreg	Twice a day	3.125-25 mg (50 mg if > 85 kg)
Metoprolol	Lopressor, Betaloc	Twice a day	12.5-75 mg

Only Carvedilol and Metoprolol have been approved for treatment of CHF in Canada. Bisoprolol has also been shown to benefit patients with heart failure. The other available beta-blockers have not been tested in CHF.

Suddenly stopping these drugs can cause serious problems. They must be tapered off gradually. Some patients may have difficulty in getting to sleep when starting on these drugs. Taking the drug no later than two hours before bedtime can help with this. For Beta blocker dosing protocols (**see appendix e Beta blocker titration protocols**).

#### 5. Calcium Blockers

Calcium channel blockers are an entirely different group of medications from beta-blockers.

These agents reduce the flow of calcium into cells, which produces relaxation of blood vessel walls. These agents increase blood flow to the heart, and as well, reduce the work of the heart. They may also relax the walls of other arteries and lower blood pressure.

Calcium blockers are used for the treatment of angina and hypertension. One of the calcium blockers is also used for the treatment of arrhythmias. There has been news media attention in recent years to the question of safety of calcium channel blockers in patients with coronary artery disease and hypertension. These concerns pertain to short acting agents. There have been many studies with all classes of calcium channel blockers. In general, when used in patients who do not have congestive heart failure, the

heart rate limiting calcium channel blockers ( verapamil and diltiazem) are safe to use in Coronary Artery Disease ( CAD) patients. Non heart rate limiting calcium channel blockers (nifedipine, amlodipine and felodipine) are safe to use in hypertension but are best avoided in CAD patients unless they are given with a Beta-blocker or unless the patients heart rate is naturally slow. Medications such as amlodipine, felodipine and diltiazem have been evaluated in Heart Failure patients and shown to be safe for angina control. They do not improve the prognosis of the Heart Failure patient.

Side effects include headache, flushing, dizziness, lightheadedness, swelling of ankles and constipation.

Take a missed dose of this drug within four hours but do not take a double dose to make up for a missed dose. To minimize dizziness, rise slowly from a sitting or lying position. Alcohol intake can make dizziness worse. Foods and drinks containing calcium can still be included in your diet in reasonable amounts. Prevent constipation by increasing your fluid and fiber intake.

#### Currently available calcium blockers

Generic Name	Brand Name	Dosing Frequency	Dosing Range (mg)
Nifedipine	Adalat XL	Once daily	20-90 mg
Amlodipine	Norvasc	Once daily	2.5-10 mg
Felodipine	Plendil, Renedil	Once daily	2.5-10 mg
Verapamil	Isoptin, Chronovera	Once – twice daily	120-240 mg
Diltiazem	Cardizem, Tiazac	Once daily	120-360 mg

#### Medications for Angina

##### 6. Nitroglycerin

Nitroglycerin is one of the oldest medications available for the treatment of angina and heart disease. Nitroglycerin dilates blood vessels reducing the workload of the heart and improves blood flow to the heart. Nitroglycerin is used under the tongue to treat attacks of angina. Follow these directions for the use of Nitroglycerin.

##### If you have chest pain:

Stop what you are doing. If the discomfort does not subside within several minutes, take a Nitroglycerin under your tongue. Avoid swallowing while the tablet dissolves. When doing so you should ensure that you are sitting or lying. Nitroglycerin can lower the blood pressure and cause dizziness. Avoid standing after taking the medications for approximately 20 minutes.

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There are two different sizes of Nitroglycerin tablets, 0.3 mg and 0.6 mg. Nitroglycerin is also available in spray form (0.4 mg). You may take one 0.3 mg tablet or one 0.4 mg spray every five minutes up to a total of four doses or one 0.6 mg every 10 minutes up to a total of two to three doses. You should never use Nitroglycerin while driving.

It is not possible to take too many nitroglycerin however, if your angina has not subsided after 20 to 30 minutes, then there is a chance you may be having a heart attack. You should then either contact your physician immediately, or have someone take you to the nearest hospital.

Nitroglycerin must be fresh to be effective. Cap the bottle quickly and tightly after each use. Replace unopened bottle after three months even if there are tablets left. Protect tablets from light.

### **7. Long-Acting Nitrates**

Long-acting nitrates are preparations of Nitroglycerin that have been formulated for prolonged action. They may be taken in pill form (Isordil, Nitrong SR, Nitrodur) or applied to the skin (Nitropaste, Transderm Nitro, Nitrodur, Minitran) or applied under the gums (Nitrogard). All of these medications provide continuous levels of Nitroglycerin in the bloodstream and are intended to prevent attack of angina. Side-effects include headache and lightheadedness. These side-effects generally wear off. If they do not, notify your physician. When taking Nitrates, avoid overly hot showers and baths as they may make you dizzy and fainting is possible. To prevent dizziness, get up slowly from a sitting or lying position.

### **Other Cardiac Medications**

#### **8. Anti-arrhythmic medications**

Anti-arrhythmic agents are medications, which are used to regulate the heart beat and to treat rhythm disorders.

They are complicated medications with significant side effects. Your physician best administers them under close supervision as, on occasions, these medications can worsen an arrhythmia. Examples of anti-arrhythmic agents include:

- Amiodarone (Cordarone)
- Propafenone (Rhythmol)
- Sotalol (Sotacor)
- Quinidine (Biquin Durules)
- Procainamide (Pronestyl)
- Disopyramide (Rythmodan, Norpace)
- Mexilitine (Mexitil)

Speak with your doctor or nurse about each of these drugs in order to learn of specific points to be aware of.

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## 9. Anti-platelets medications

Antiplatelet agents are medications, which interfere with the action of small elements in the blood called platelets. Platelets adhere to bleeding sites and initiate the clotting process. Aspirin is the best known and most widely used antiplatelet agent. These agents are used to treat unstable angina and to prevent stroke and heart attack. Other agents include Dipyridamole (Persantine) and Sulfinpyrazone (Aururan). Newer agents include Ticlopidine (Ticlid) and Clopidogrel (Plavix). Side effects include gastrointestinal upset and bleeding. To relieve mild GI distress take enteric coated aspirin or take these medications with food or milk. Don't take aspirin with alcohol to avoid intestinal bleeding.

## 10. Anti-coagulants

Warfarin (Coumadin) is the most commonly administered anticoagulant. This medication interferes with normal blood clotting mechanisms by reducing certain circulating blood proteins, which normally act to form blood clots. Warfarin may be used inpatients with atrial fibrillation (a cardiac arrhythmia) to prevent stroke or embolism.


Warfarin may be given to patients with deep vein thrombosis (DVT, phlebitis) and in pulmonary embolism (a condition where blood clots travel from the veins in the legs to the lungs producing chest pain). Warfarin is also administered when blood clots form in the heart after a heart attack. On occasion Warfarin is also recommended in patients with severe blockages of coronary arteries.

While taking Warfarin the patient is at increased risk of bleeding. It is therefore necessary to monitor by a blood test called the prothrombin time, often referred to as PT. The PT is standardized between laboratories and reported as the INR (International Normalized Ratio). The INR is maintained between 2 and 3 to prevent clotting in atrial fibrillation, phlebitis and other conditions. With mechanical heart valves, the INR is maintained between 2.5 and 3.5. The INR should be maintained within a narrow range in order to ensure that the blood is neither too thin nor too thick. Excessive thinning of the blood can lead to bleeding. Based on INR determinations, your physician should advise you as to your dose of Warfarin you should be taking. Often the dose of warfarin is not stable and may have to be adjusted frequently to keep the INR in the therapeutic range.


Take a missed dose of Warfarin within eight hours but never take a double dose to make up for the missed dose. Be aware that you have a risk of bleeding. Being careful can reduce this risk. Never walk about barefoot. Use an electric razor for shaving, use a soft toothbrush, and wear gloves to protect your hands when doing heavy work. Limit alcohol consumption (1-2 drinks/day).

There are many drugs, which interact with Warfarin and alter its effect. While taking Warfarin, do not take any new medications without the advice and knowledge of your physician.

## X. CHF MANAGEMENT CHECKLIST

✓	Approach	Reccomendations
	Symptoms & Signs of HF:	Fatigue (low cardiac out-put), SOB, ↑ JVP, rales, S3, edema, radiologic congestion, cardiomegaly. Elevated BNP. CXR to r/o infection, interstitial lung disease & PPH (Primary Pulmonary Hypertension)
	Ejection fraction (echocardiogram, LV gated study, CT angiogram or MRI)	<p>≤ 40% = systolic dysfunction</p> <p>40-55% = mixed systolic and diastolic dysfunction</p> <p>≥ 55% = diastolic dysfunction - treat underlying disorder:</p> <p><b>HPT/ischaemia/pericardial constriction/restrictive CM (cardiomyopathy)/infiltrative disorders</b></p>
	Consider etiology	<p>○ Ischemic-CM ○ HPT- CM ○ Valvular HD-CM (AS/AR/MR)</p> <p>○ Metabolic: hyper/hypo-thyroidism/hemochromatosis/pheochromocytoma</p> <p>○ Toxins: Alcohol/anthracyclines/cocaine/trastuzumab/amphetamines and other chemotherapy ○ Viral CM ○ Idiopathic Dilated CM</p>
	Identify triggers	
	Acute-sudden onset	Ischaemia, arrhythmia, infection, pulmonary embolism, acute valvular pathology
	Chronic-gradual onset	Anemia, thyrotoxicosis, non-compliance, diet, Rx e.g. NSAID's
	Treatment:	Correct triggers and precipitants of acute and chronic Heart Failure
	General measures	<ul style="list-style-type: none"> <li>• Low sodium diet/protein nutrition</li> <li>• Regular exercise/activity</li> <li>• D/C smoking</li> <li>• Control hypertension</li> <li>• Treat and control diabetes</li> <li>• Identify &amp; Rx depression</li> <li>• Treat lipid abnormalities</li> <li>• Tx ischemia:PCI,CABG/Valve Sx</li> </ul>
	<p><b>Symptomatic therapy</b></p> <p>Goals: ↓ symptoms</p> <p style="text-align: center;">↑ Quality of Life</p>	<p><b>Diuretics - titrate to euvolemic state</b></p> <ul style="list-style-type: none"> <li>• Maintain Ideal Body Weight (dry weight = JVP normal/trace pedal edema)</li> <li>• Furosemide 20 mg – 80 mg OD-BID</li> <li>• HCT/Zaroxolyn for refractory congestion</li> </ul>
	<p><b>Therapy to:</b></p> <ul style="list-style-type: none"> <li>• Improve prognosis</li> <li>  </li> <li>• Prevent progressive LV dysfunction</li> </ul>	<p><b>ACE Inhibitors-General Guideline:</b></p> <p>Start low and titrate to the target dose used in the clinical trials or the <b>MAXIMUM TOLERATED DOSE:</b></p> <ul style="list-style-type: none"> <li>• Captopril 6.25 → 50 mg BID-TID</li> <li>• Enalapril 2.5mg → 10 mg BID†</li> <li>• Ramipril 2.5 mg → 5 mg BID §</li> <li>• Lisinopril 2.5 mg → 30-40 mg OD</li> <li>• Trandolapril 1 → 4 mg OD‡</li> <li>• *Quinapril 10 mg → 40 mg OD</li> <li>• *Cilazapril 0.5 mg → 10 mg OD</li> <li>• *Fosinopril 5 mg → 40 mg OD</li> <li>• *Perindopril 4 mg → 8 mg OD</li> </ul> <p>*No large scale HF outcome trials</p> <p>† SoLVD/X-SoLVD § AIRE / AIREX ‡ TRACE</p> <p>Consider ISDN 5-40mg</p> <p>QID+Hydralazine 10-75mg QID for ACE-I/ARB intolerance VHeFT</p>



ARB's	<b>Angiotensin II receptor antagonists (ARB's)</b> <ul style="list-style-type: none"> <li>• ACE-Inhibitors remain first line therapy</li> <li>• ARB's indicated in ACE-I intolerant patients</li> <li>• (CHARM candesartan 16-32 mg OD) (Val-HeFT /VALIANT valsartan 160 mg BID)</li> </ul>
Beta Blockers  <b>Limit β blocker dose in the elderly:</b> Bisoprolol 5 mg daily (CIBIS-ELD) Carvedilol 12.5 mg BID (COLA II)	<b>General Guidelines</b> - Add Beta-blocker* to ACE-inhibitor/diuretic/+/- digoxin in stable Class II-IV CHF/LVEF < 40% (*No outcome data for other beta-blockers) <ul style="list-style-type: none"> <li>• Bisoprolol* 1.25→10 mg OD (CIBIS II Trial)</li> <li>• Carvedilol* 3.125 mg BID→25 mg BID (50 mg BID if weight &gt; 85 kg)</li> <li>• Metoprolol* 12.5 mg BID→75 mg BID (MERIT Trial)</li> </ul>
<b>Aldosterone antagonists</b> <i>Caution: diabetics/renal disease/elderly/ NSAIDs &amp; COX-2 inhibitors</i>	<ul style="list-style-type: none"> <li>• Spironolactone 12.5-25 mg OD added to ACE-inhibitor/diuretic/+/- digoxin in stable Class III-IV CHF/LVEF ≤ 35%/CR&lt;220/K&lt;5.0 (RALES Trial)</li> <li>• Epleronone 25-50 mg OD in post MI HF (heart failure) with LVEF ≤ 40% (EPHESUS Trial) or 25 mg every 2nd day to 50 mg daily depending on GFR) in Class II HF with LVEF ≤ 35% (EMPHASIS Trial).</li> <li>• Follow K/Cr in 3-7 days/↓ furosemide to avoid azotemia)</li> </ul>
<b>DIG Trial:</b> 6%↓ in all cause hospitalization and 8%↓ in HF hospitalization. With Dig level < 0.9 ng/mL – 23%↓ in all cause mortality, 37%↓ in HF mortality and 38%↓ in HF hospitalization.	Digoxin-for persisting symptoms in NSR (systolic dysfunction) or symptoms and rate control in Afib. Dose: 0.125 mg – 0.25 mg OD (Lower dose in elderly or renal failure: 0.0625 mg OD or less frequently) Digoxin used as foundation therapy in major HF Trials (SOLVD 68% on Digoxin; US Carvedilol 90% on digoxin; RALES 72% on Digoxin.)
Anti-coagulant anti-platelet therapy	<b>ASA</b> if CAD (↓ dose to ↓ ACE inhibitor interaction) <b>Coumadin</b> or <b>NOAC</b> for Afib, LV thrombus, ↓ LVEF ≤ 20%, DVT or pulmonary embolism Duration of A/C therapy: Indefinite for Afib/recurring systemic TE or DVT/PE

**Consider Internal Medicine/Cardiology or Heart Failure Clinic referral for initiation/titration of β-blocker. Consider EPS referral for symptomatic sustained or non-sustained ventricular arrhythmia (LVEF 30-40%) or AICD: Prior MI/CAD (LVEF ≤ 30% with IVCD ≥ 0.12 sec: MADIT II) CHF: (NYHA II-III & LVEF <35% SCD-HeFT) Cardiac Resynchronization Therapy(CRT):(NYHA Class III-IV with reduced ejection fractions; LVEF < 35%; QRS duration ≥ 0.13 seconds with LBBB or ≥ 0.15 seconds with non-LBBB: MIRACLE / MUSTIC) or both CRT/AICD: (NYHA III-IV;QRS ≥ 0.12:COMPANION). LVAD/ Transplant for refractory CHF.**

This checklist details what your doctor needs to know and do to optimally manage your condition. Diagnosis is based on the signs and symptoms of CHF. An echocardiogram or other measure of left ventricular function is useful to assess the severity of pump dysfunction or weakness. The various causes of CHF are listed. A variety of acute and chronic triggers of CHF need to be identified. Treatment consists of general measures to control symptoms as well as diuretic and digoxin therapy for symptomatic relief. Specific measures to improve prognosis and outcome are highlighted on the next page and should be reviewed continuously in the management of your condition. By Following this strategy the best outcomes in CHF management can be achieved.

## XII. CHF FOLLOW-UP CHECKLIST

Rx ✓	Date ✓ Achieved	Date ✓ Achieved	Date ✓ Achieved	Date ✓ Achieved	Date ✓ Achieved	Date ✓ Achieved	Date ✓ Achieved
Weight Kg./lbs.							
NYHA Class <sup>1</sup>							
Subjective Symptoms B,W,NC <sup>2</sup>							
HR							
BP (S/D)							
↑ JVP (Y/N) <sup>3</sup>							
S3 (Y/N) <sup>3</sup>							
Rales (Y/N)							
Edema (Y/N)							
ECG							
CXR (Y/N) congestion							
K+ (potassium)							
Creatinine							
Digoxin level							
BNP <100 pg/mL							
ACE-i agent/dose							
ARB agent/dose							
β-blocker agent/dose							
Aldactone/Epleronone							
Digoxin dose (maintain level ≤ 1 nmol/L)							
Diuretic <sup>1</sup> agent/dose							
Diuretic <sup>2</sup> agent/dose							
Nitrate agent/dose							
Hydralazine dose							

<sup>1</sup> Class I: No symptoms with ordinary activity/ Class II: Symptoms with ordinary activity/  
Class III: Symptoms with less than ordinary activity/ Class IV: Symptoms at rest

<sup>2</sup> B = better, W = worse, NC = no change

<sup>3</sup> Y = present, N = absent

## XII. HEART FAILURE EXERCISE Rx

		AGE											
		30	35	40	45	50	55	60	65	70	75	80	85
HR Max													
100 %		190	185	180	175	170	165	160	155	150	145	140	135
85		161	157	153	149	145	140	136	132	128	123	119	115
80		152	148	144	140	136	132	128	124	120	116	112	108
70		133	130	126	123	119	116	112	109	105	102	98	95
60		114	111	108	105	102	99	96	93	90	87	84	81
50		95	93	90	88	85	83	80	78	75	73	70	67

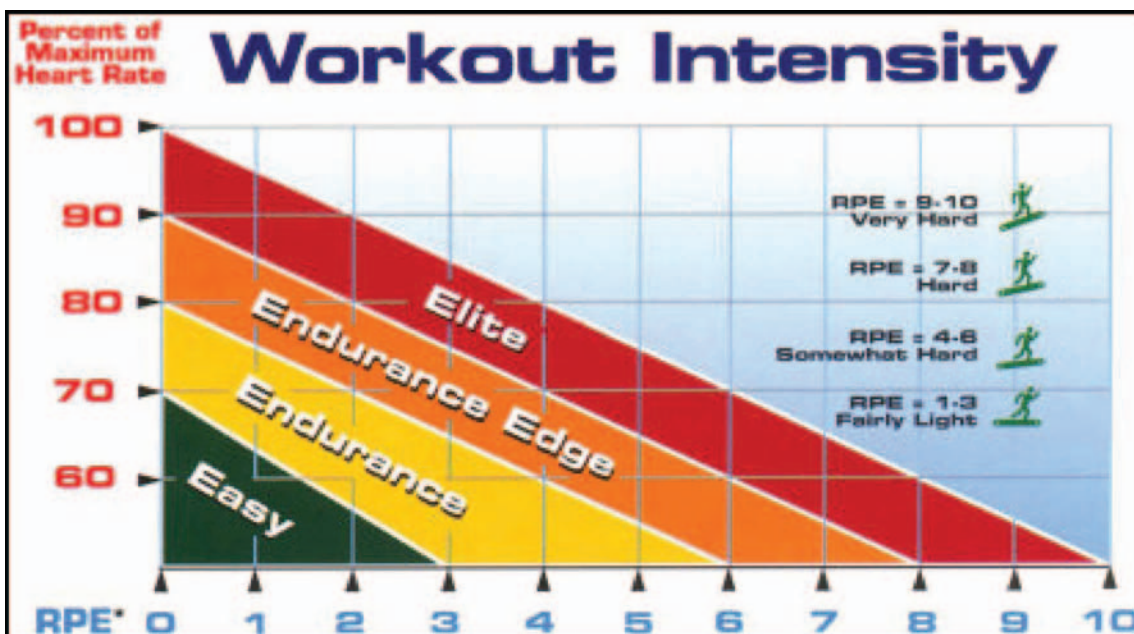
**Calculating Your Target Heart Rate**

- 1)  $220 - \text{age} = \text{MHR}$  (maximum heart rate)
- 2)  $\text{MHR} \times 0.8 = \text{_____}$  (this is the upper end of your target HR)
- 3)  $\text{MHR} \times 0.7 = \text{_____}$  (this is the mid range of your target HR)
- 4)  $\text{MHR} \times 0.6 = \text{_____}$  (this is the low end of your target HR)
- 5)  $\text{MHR} \times 0.5 = \text{_____}$  (this is the low end target HR for Heart Failure patients)

For patients with ischaemia and/or exercise induced arrhythmia, set exercise HR in a 10-15 beat range, 10 beats below the onset of ischaemia and/or arrhythmia.

Initiate exercise at 60% of maximum predicted HR and progress to 70-80 % of maximum HR. For Heart Failure patients, initiate at 50 % MHR and progress to 60-70 % MHR.

**STOP ACTIVITY IF YOU EXPERIENCE CHEST PAIN OR SHORTNESS OF BREATH DURING OR AFTER YOUR EXERCISE SESSION. NOTIFY YOUR PHYSICIAN**



### XIII. MEDICATION PRESCRIPTIONS

Medication	Dose (mg)	Frequency	Indication
1. Nitroglycerin SL			Angina treatment
2. Long Acting Nitrate			Angina prevention
3. ASA			Blood thinner
4. Other anti-platelet agent			Blood thinner
5. Warfarin:	Low Dose INR = 2.0-3.0	Medium Dose INR = 2.5-3.5 /	
	High Dose = INR 3.0-4.5		
			Blood thinner
6. Beta Blocker			LV function/prognosis
7. ACE inhibitor			LV function/prognosis
8. Angiotensin II receptor blocker-ARB			LV function/prognosis
9. Statin			Cholesterol lowering
10. Other Lipid Lowering Rx			Cholesterol lowering
11. Calcium Blocker			Angina/hypertension
12. Digoxin			Afib/symptoms of HF
13. Diuretic			
○ furosemide	20, 40, 60, 80, 120	OD, BID, TID	Fluid retention
○ ethracrynic acid	25, 50, 100	OD, BID	Fluid retention
15. 2nd Diuretic			Fluid retention
16. Aldactone	12.5, 25, 50	EOD OD BID	Prevents K loss, prognosis
17. Anti-arrhythmic agent			Afib/VT



## XIV. EDUCATIONAL RESOURCES

### Web Site Links:

<b>Atrial Fibrillation.com</b>	<a href="http://www.aboutatrialfibrillation.com">http://www.aboutatrialfibrillation.com</a>
<b>American Diabetes Association</b>	<a href="http://www.diabetes.org">http://www.diabetes.org</a>
<b>American Heart Association</b>	<a href="http://www.americanheart.org/presenter.jhtml?identifier=1200000">http://www.americanheart.org/presenter.jhtml?identifier=1200000</a>
<b>American Medical Association (AMA) Consumer Page</b>	<a href="http://www.ama-assn.org/ama/pub/category/3457.html">http://www.ama-assn.org/ama/pub/category/3457.html</a>
<b>Angioplasty (PTCA)</b>	<a href="http://www.ptca.org/">http://www.ptca.org/</a>
<b>Angioplasty (PTCA) Medtronic</b>	<a href="http://www.medtronicave.com/noflash/patients/home.shtml">http://www.medtronicave.com/noflash/patients/home.shtml</a>
<b>Canadian CHF Clinics Network</b>	<a href="http://www.cchfcn.org/english/index.htm">http://www.cchfcn.org/english/index.htm</a>
<b>Canadian Cardiovascular Society</b>	<a href="http://www.ccs.ca">http://www.ccs.ca</a>
<b>Canadian Diabetes Association</b>	<a href="http://www.diabetes.ca">http://www.diabetes.ca</a>
<b>Canadian Health Network</b>	<a href="http://www.canadian-health-network.ca/">http://www.canadian-health-network.ca/</a>
<b>Cardiac Rehabilitation and Prevention Patient Info</b>	<a href="http://www.jhbmc.jhu.edu/cardiology/rehab/patientinfo.html">http://www.jhbmc.jhu.edu/cardiology/rehab/patientinfo.html</a>
<b>Cardiosource</b>	<a href="http://www.cardiosource.com/">http://www.cardiosource.com/</a>
<b>Canadian Hypertension Society</b>	<a href="http://www.chs.md/index2.html">http://www.chs.md/index2.html</a>
<b>emedicine.com</b>	<a href="http://www.emedicine.com/">http://www.emedicine.com/</a>
<b>Family Doctor.org</b>	<a href="http://familydoctor.org/">http://familydoctor.org/</a>
<b>healthcommunities.com</b>	<a href="http://www.healthcommunities.com/health/">http://www.healthcommunities.com/health/</a>
<b>Health Canada</b>	<a href="http://www.hc-sc.gc.ca/english">http://www.hc-sc.gc.ca/english</a>
<b>Health Canada-Adult Health Interactive</b>	<a href="http://www.hc-sc.gc.ca/pphb-dgsp/ah-sa_e.html">http://www.hc-sc.gc.ca/pphb-dgsp/ah-sa_e.html</a>
<b>Health Canada-Healthy Heart Kit</b>	<a href="http://www.hc-sc.gc.ca/pphb-dgsp/ccdpc-cpcmc/hhk-tcs/english/index_e.htm">http://www.hc-sc.gc.ca/pphb-dgsp/ccdpc-cpcmc/hhk-tcs/english/index_e.htm</a>
<b>Health Care Information Resources</b>	<a href="http://www-hsl.mcmaster.ca/tomflem/top.html">http://www-hsl.mcmaster.ca/tomflem/top.html</a>
<b>Health-Heart.org (Nutrition, Health &amp; Heart Disease)</b>	<a href="http://www.health-heart.org/acceuil.htm">http://www.health-heart.org/acceuil.htm</a>
<b>Healthy Ontario</b>	<a href="http://www.healthyontario.com/english/index.asp">http://www.healthyontario.com/english/index.asp</a>
<b>Heart Disease</b>	<a href="http://www.merck.com/disease/heart">http://www.merck.com/disease/heart</a>
<b>Heart Failure Online</b>	<a href="http://www.heartfailure.org">http://www.heartfailure.org</a>
<b>Heart Failure Society of America</b>	<a href="http://hfsa.org">http://hfsa.org</a>
<b>HeartInfo.org</b>	<a href="http://www.heartinfo.org/">http://www.heartinfo.org/</a>
<b>Heart Valve Disease-Medtronic</b>	<a href="http://www.medtronic.com/cardiac/heartvalves">http://www.medtronic.com/cardiac/heartvalves</a>
<b>Heart Valve Disease-St. Jude Medical</b>	<a href="http://www.sjm.com/4.0/4.0.jsp">http://www.sjm.com/4.0/4.0.jsp</a>
<b>HeartInfo-Heart Information Network</b>	<a href="http://www.heartinfo.com/hinf_hp.html">http://www.heartinfo.com/hinf_hp.html</a>
<b>Heart and Stroke Foundation of Canada</b>	<a href="http://ww2.heartandstroke.ca">http://ww2.heartandstroke.ca</a>
<b>HeartPoint Home Page</b>	<a href="http://www.heartpoint.com/index.html">http://www.heartpoint.com/index.html</a>
<b>High Blood Pressure Treatment News</b>	<a href="http://www.merck.com/disease/hypertension/">http://www.merck.com/disease/hypertension/</a>
<b>MedBroadcast</b>	<a href="http://www.medbroadcast.com/about_us/">http://www.medbroadcast.com/about_us/</a>
<b>MEDEM Healthcare Information</b>	<a href="http://www.medem.com/MedLB/sub_detailb.cfm?parent_id=68&amp;act=disp">http://www.medem.com/MedLB/sub_detailb.cfm?parent_id=68&amp;act=disp</a>
<b>Medlineplus</b>	<a href="http://www.nlm.nih.gov/medlineplus/">http://www.nlm.nih.gov/medlineplus/</a>
<b>National Women's Health Information Center (USPHS/Office on Women's Health)</b>	<a href="http://www.4woman.gov">http://www.4woman.gov</a>
<b>National Heart, Lung and Blood Institute</b>	<a href="http://www.nhlbi.nih.gov/index.htm">http://www.nhlbi.nih.gov/index.htm</a>
<b>National Stroke Association</b>	<a href="http://www.stroke.org/">http://www.stroke.org/</a>
<b>Pacemaker Club</b>	<a href="http://www.pacemakerclub.com/index.htm">http://www.pacemakerclub.com/index.htm</a>
<b>Pacemakers-Guidant</b>	<a href="http://www.guidant.com/condition/arrhythmia/">http://www.guidant.com/condition/arrhythmia/</a>
<b>Pacemakers-Medtronic</b>	<a href="http://www.medtronic.com/patients/heart.html">http://www.medtronic.com/patients/heart.html</a>
<b>Pacemakers St Jude Medical</b>	<a href="http://www.sjm.com/4.0/4.3/4.3.shtml">http://www.sjm.com/4.0/4.3/4.3.shtml</a>

<b>Society of Obstetricians and Gynecologists of Canada: Heart Disease and Women</b>	<a href="http://sogc.medical.org/SOGCnet/sogc_docs/common/pub_ed/english/heartdisease/index.htm">http://sogc.medical.org/SOGCnet/sogc_docs/common/pub_ed/english/heartdisease/index.htm</a>
<b>St. Michael's Cardiac Prevention &amp; Rehabilitation Centre</b>	<a href="http://www.stmichaelshospital.com/content/programs/cardiac/index.asp">http://www.stmichaelshospital.com/content/programs/cardiac/index.asp</a>
<b>The Health Infopark</b>	<a href="http://www.merck.com/disease">http://www.merck.com/disease</a>
<b>Up To Date-Patient Resource Center</b>	<a href="http://www.uptodate.com/patient_info/patient_info_index.asp?user=patient">http://www.uptodate.com/patient_info/patient_info_index.asp?user=patient</a>
<b>Virtual Hospital Home Page</b>	<a href="http://www.vh.org">http://www.vh.org</a>
<b>WebMD.com</b>	<a href="http://WebMD.com">http://WebMD.com</a>
<b>World Health Association</b>	<a href="http://www.who.ch">http://www.who.ch</a>
<b>You Can Quit Smoking Tearsheets</b>	<a href="http://www.surgeongeneral.gov/tobacco/tearsheeteng.pdf">http://www.surgeongeneral.gov/tobacco/tearsheeteng.pdf</a>

### **Patient Education Books**

All of the following books may be available at your local **Chapters** or **Indigo** book stores or by visiting the website: [www.chapters.indigo.ca](http://www.chapters.indigo.ca).

#### **Stroke-Free for Life: The Complete Guide to Stroke Prevention and Treatment**

Author: David O Wiebers

#### **Get With The Program**

Author: Bob Greene

#### **Everything Stress Management Book**

Author: Eve Adamson

#### **Take A Load Off Your Heart: 114 Things You Can Do to Prevent or Reverse Heart Disease**

Author: Joseph Piscatella

#### **Leslie Beck's Nutrition Encyclopedia:**

Managing Over 75 Health Concerns with Diet, Vitamins, Minerals and Herbs

Author: Leslie Beck

#### **The Ultimate Healthy Eating Plan: That Still Leaves Room for Chocolate**

Author: Liz Pearson

#### **Thriving With Heart Disease**

Author: SOTILE

#### **Women are Not Small Men: Life-Saving Strategies for Preventing and Healing Heart Disease in Women**

Author: Nieca Goldberg

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**The New 8-Week Cholesterol Cure: The Ultimate Program for Preventing Heart Disease**

Author: Robert E. Kowalski

**Reversing Heart Disease**

Author: Julian Whitaker M.D

**Dr. Dean Ornish's Program For Reversing Heart Disease**

Author: Dean Ornish

**Recovering from Heart Disease in Body & Mind: Medical and Psychological Strategies for Living with Coronary Artery Disease**

Author: Brian Baker, Paul Dorian

**The Healing Power of Exercise: Your Guide to Preventing and Treating Diabetes, Depression, Heart Disease, High Blood Pressure, Arthritis, and More**

Author: Linn Goldberg

**The Heart Disease Breakthrough: What Even Your Doctor Doesn't Know About Preventing a Heart Attack**

Author: Thomas Yannios

**Her Healthy Heart: Womans Gd To Preventing & Reversing Heart Disease**

Author: Linda Ojeda

**Beyond Cholesterol: The Johns Hopkins Complete Guide for Avoiding Heart Disease**

Author: Peter OJr. Kwiterovich

**The Human Heart: A Basic Guide to Heart Disease**

Author: Brendan Phibbs

**Reversing Heart Disease: The Nonsurgical Approach**

Author: Julian Whitaker

**Heart Fitness for Life: The Essential Guide for Preventing and Reversing Heart Disease**

Author: MARY P MCGOWAN, Jo MCGowan Chopra

**The Carbohydrate Addict's Healthy Heart Program: Break Your Carbo-Insulin Connection to Heart Disease**

Author: Richard F. Heller



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**Cooking Ala Heart Cookbook: Delicious Heart Healthy Recipes to Reduce Risk of Heart Disease & Stroke, Second Edition**

Author: Linda Hachfeld, Betsy Eykyn

**Stress Diet And Your Heart**

Author: Dean Ornish

**The Mediterranean Diet: Reaping Nature's Bounty for Leaner, Heart-Healthy Living**

Author: Marissa Cloutier

**American Heart Association Low-salt Cookbook, Second Edition: A Complete Guide to Reducing Sodium and Fat in Your Diet**

Author: AMERICAN HEART ASSOCIATION

**The Mediterranean Heart Diet**

Author: Helen Fisher

**The Living Heart Diet**

Author: Michael E. DeBaakey, Antonio Gotto

**The Homocysteine Revolution**

Author: KILMER S MCCULLY

**Homocysteine in Health and Disease**

Published By Cambridge University Press | Published 2001

**Heart Revolution: Medical Breakthrough That Cuts Your Risk of Heart Disease, Lowers Homocysteine Levels and Helps You Live a Longer, Healthier Life**

Author: Kilmer McCully

**Dr. Atkins' New Diet Revolution**

Author: Robert C. Atkins

**Anne Lindsay's New Light Cooking**

Author: Anne Lindsay

**The New Lighthearted Cookbook: Recipes for Healthy Heart Cooking**

Author: Anne Lindsay

## XV. EVALUATION

Please help us assess the value of this booklet. Return to Dr. Niznick or mail to his office on completion:

**Joel Niznick MD FRCPC**

502-1355 Bank St.

Ottawa, Ontario

K1H 8K7

613-738-1584

Fax 738-9097

**Place a check mark in the ranking box:**

	Not at all	A little	Moderately	A lot	Yes!!!
The booklet was informative					
The booklet was easy to read					
The booklet made me nervous					
The booklet settled my anxieties					
The booklet was too complicated					
The booklet answered my questions					
The pictures & diagrams frightened me					
The pictures & diagrams made things clearer					
There should be more pictures & diagrams					

**Other areas I'd like to see covered include:**

Specific diet sheets on:	Yes	No
Hypertension-low salt		
Hypertension-potassium replacement		
Low cholesterol		
Heart failure-no salt		
Diabetes		

**Other areas I'd like to see covered continued:**

	Yes	No
More on non-traditional risk factors		
• Anti-oxidants		
• Vitamin E		
• Homocysteine		
• Others-list:		
Available cardiac wellness programs		
Available cardiac rehab programs		
Smoking cessation programs		
Psychological support information and programs		
Spousal support information and programs		
Other-list:		
My major source of information on heart disease will be:		
This booklet		
My cardiologist		
The nurses		
My family doctor		
Books		
TV		
Computer-the internet		
Education and rehab programs		
Other-list:		

**General Comments:**

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## **XVII. APPENDICIES**

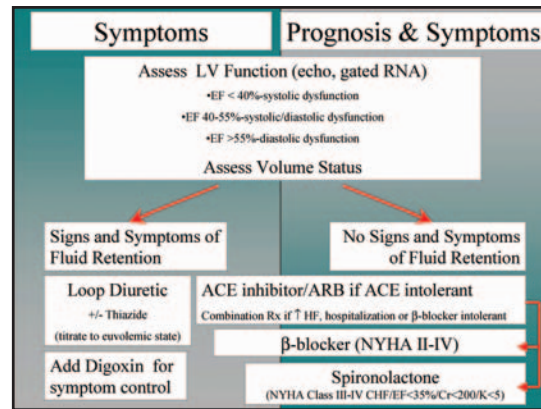
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# A. A SIMPLE APPROACH TO HEART FAILURE

## DIET Approach to the Patient With Heart Failure

- Diagnose**
  - Etiology
  - Severity (LV dysfunction)
- Educate**
  - Diet
  - Exercise
  - Lifestyle
  - CV Risk
- Initiate**
  - Diuretic/ACE inhibitor
  - $\beta$ -blocker
  - Spirolactone
  - Digoxin
- Titrate**
  - Optimize ACE inhibitor
  - Optimize  $\beta$ -blocker



## Optimal Dosing of ACE Inhibitors

- General Guideline:
- Start low and titrate to the target dose used in the clinical trials or the **MAXIMUM TOLERATED DOSE** (ATLAS trial)
- Captopril 6.25-12.5 mg  $\Rightarrow$  50 mg BID-TID (SAVE)
- Enalapril 2.5 mg BID  $\Rightarrow$  20 mg BID (SOLVD/X)
- Ramipril 2.5 mg BID  $\Rightarrow$  5 mg BID (AIRE/EX)
- Lisinopril 10 mg OD  $\Rightarrow$  30-40 mg OD (GISSI 3)
- Trandolapril 1mg  $\Rightarrow$  4 mg (TRACE)

## $\beta$ -adrenergic Blocking Agents

- Titrate to target dose
  - Bisoprolol 1.25 - 10 mg OD
  - Carvedilol 3.125 - 25 mg BID
  - Metoprolol 12.5 - 50 to 75 mg /BID
- If unable to tolerate high dose  $\beta$ -blocker maintain highest tolerated dose
- Continue indefinitely

## Patient Selection for Successful $\beta$ - Blocker Initiation

- Stable symptoms
- Stable background heart failure medications
- No recent CV hospitalization
- Stable CV status (no hypotension or bradycardia)
- Euvolemic status
- Start low and titrate slowly

## Patients With Heart Failure Who Should **Not** Be Started on $\beta$ -blockers.

- General Contraindications
  - Bronchospastic pulmonary disease
  - Severe bradycardia, high degree AV block, sick sinus syndrome
- Heart Failure Considerations
  - Congestive symptoms at rest (NYHA Class IV)
  - Patients who require intravenous therapy for HF
  - Unstable symptoms or recent changes in background medications
  - Hospitalized patients (especially for worsening HF)

## **B. HEART FAILURE: DO'S AND DON'TS**

---

### **DO:**

1. Get plenty of rest
2. Avoid salt in your diet, at the table and in your canned or processed foods
3. Keep as active as you can
4. Take all your medicines as directed
5. Weigh yourself frequently and keep a weight diary-increasing weight can be an early sign of worsening heart failure.  
!!! Report any increase in weight or 2.2 lbs ( 1 kg) over 24 hours or 5 lbs over 1 week.
6. Report any change in symptoms to your doctor
7. Drink alcohol only in moderation or not at all if your doctor directs
8. Learn about your condition
9. Obtain yearly flu shots
10. Control other cardiac risk factors and conditions (see section cardiac risk factors)

### **DO NOT:**

1. Eat a lot of salt (salt leads to fluid retention)
2. Drink excessive fluids – in general no more than 6-8 cups of fluid/day
3. Smoke
4. Drink excessive alcohol
5. Skip your medications or adjust them without the direction of your physician
6. Take over the counter medications, particularly anti-inflammatory agents, without alerting your physician

## C. RESTRICTED SODIUM DIET (2 g / 87 mmol sodium)

Look for foods with 250mg or less sodium content. 1 full meal = Less than 400mg sodium

- Use herbs and spices to flavour foods. Maximum 1 tsp (5 mL) of salt allowed per day in the cooking of food.
- Do not add salt at the table.
- Avoid salty prepackaged foods such as snack foods, convenience foods, and fast foods.
- Read labels carefully.
- Salt substitutes may be used. **Check with your physician.**
- Some medications, such as laxatives and antacids, contain sodium. Check with your physician or pharmacist. Read labels on packaged foods carefully.
- Foods listing salt or sodium at the beginning of the ingredient list are high in salt. Some labels use the symbol “Na” for sodium. Foods containing less than **250mg** sodium per serving are appropriate.

### Foods to Choose:

### Foods to Avoid:

#### Grain Products

**Breads:** fresh bread, rolls, or muffins (without cheese)

Bread and biscuit mixes, commercial muffins

**Crackers:** graham, melba toast, rice cakes (plain only), reduced salt crackers, and matzoh

English muffins

Salted crackers

**Cereals:** cooked cereals without salt

Packaged instant cooked cereals

**Dry Cereals:** Muffets, Shredded Wheat, puffed rice or wheat

Packaged breading products and stuffing mixes

Pre-seasoned rice or pasta products

Rice or pasta prepared without salt

Commercial waffles and pancakes

Packaged rice and pasta - flavoured

#### Vegetables and Fruits

All fruits and fruit juices (fresh, frozen, canned, or dried without sodium additives)

Artificial fruit flavoured crystals with sodium additives

Fresh or frozen (no salt added) vegetables

Regular canned vegetables and vegetable juices

Pickled vegetables (e.g. sauerkraut)

Canned low sodium vegetables

Instant or canned potatoes

Fresh or low sodium tomato or vegetable juice

Regular canned tomatoes and tomato or spaghetti

Low sodium tomato paste, canned tomatoes and tomato sauce

sauce. No canned tomato/vegetable or clamato juice (unless low sodium)

#### Milk Products

Milk, cream, yogurt, sour cream, chocolate milk

Buttermilk, malted milk, evaporated or condensed milk

Limit Instant Breakfast to 1 cup (250 mL) per day

Hot chocolate mixes

Low sodium cheese and cottage cheese

Regular cheese or processed cheese slices or spreads

#### Meat and Alternatives

Meat, poultry, and fish without salt or sodium products

Salted, smoked, cured, or pickled meat, fish, and poultry – luncheon meats, bacon, ham, sausages,

Eggs

wieners, sardines, herring Pickled eggs

Unsalted peanut butter, nuts, and seeds

## C. RESTRICTED SODIUM DIET (cont'd)

### Foods to Choose (cont'd):

#### Meat and Alternatives (cont'd)

#### Fats and Oils

Any except those on opposite list

#### Sweets

Any except those on opposite list

#### Snack Foods - unsalted only

Unsalted popcorn (air popped)

#### Beverages

Any except those on opposite list

#### Soups

Low sodium broth or canned soups,  
Homemade soups (made without salt)

#### Seasonings and Condiments

Unsalted herbs and spices  
Dry mustard  
Vanilla extract, lemon, lime, vinegar, cocoa  
Salt-free condiments (e.g. salt-free ketchup)  
Limit of 1 tsp (5 mL) per day of the following:  
barbeque, steak and Worcestershire sauces,  
horseradish, ketchup, prepared mustard, relish, salsa

#### Fast Foods

### Foods to Avoid (cont'd):

Salted peanut butter, nuts, and seeds  
Convenience foods (e.g. canned: stews, pastas, beans)  
Fast foods (e.g. hamburgers, pizza)

Bacon fat  
Packaged gravies, sauces, salad and vegetable dips  
Commercial salad dressings

Commercial cakes, pies, pastries, desserts, instant  
pudding mixes

Salted chips, cheezies, pretzels, and popcorn

Water treated with water softener  
Mineral waters with a sodium content greater than  
250 mg Na/L  
Ovaltine and sports beverages such as Gatorade

Meat extracts (e.g. bouillon, Oxo)  
Regular canned soups or dried soup mixes

Sea salt, seaweed  
Salted herbs (e.g. garlic salt)  
Meat tenderizers  
MSG (monosodium glutamate)  
Salt substitutes containing salt (e.g. Lite Salt)  
Regular pickles, olives, and relishes  
Soya sauce and oriental sauces (e.g. teriyaki)

Most contain very high levels of salt/sodium. To verify  
the sodium content of foods, ask for the company's  
"Nutritional Guide" or go to their website.

Revised by Helene Charlebois, BSc., RD.



## **D. POTASSIUM REPLACEMENT DIET**

Potassium (also known as 'K<sup>+</sup>') is a mineral which is found in the blood and in the cells of the body. Potassium is needed for normal muscle and nerve function. The kidneys regulate the amount of potassium in the body. Some diuretics (blood pressure or "water" pills) can cause the body to excrete too much potassium. In order to maintain normal muscle function in the body, potassium loss must be replaced. This potassium can be replaced by consuming foods high in potassium. Potassium is found in foods in all four food groups in Canada's Food Guide to Healthy Eating, especially in the vegetable and fruit group. Include a variety of foods rich in potassium in your daily diet.

### **Guidelines**

- Eat vegetables and fruit raw as often as possible.
- Serve canned fruit in its juice (juice contains potassium).
- Use cooking methods such as: steaming, stir frying, microwaving, or baking, which keeps the potassium in the foods. Leave skins on when cooking vegetables and fruits.
- If you boil vegetables, use a small amount of water because potassium is lost in the cooking water. Use this water for soups and sauces.
- **Check with your physician** when using a salt substitute that contains potassium.

### **Grain Products - Most whole wheat products contain K<sup>+</sup>**

Bran and whole grain cereals (e.g. All Bran, Bran Buds, Raisin Bran)

Whole grain breads (e.g. dark rye, pumpernickel)

Granola

English Muffins - whole wheat

Wheat germ

### **Vegetables - High K<sup>+</sup> = tomatoes, potatoes**

Beet greens, chard, lima beans, potato - white or sweet (with skins), squash - winter or pumpkin, parsnips, asparagus, Brussel sprouts, spinach, rutabaga / turnip, peas, beans, carrots, cauliflower, corn, celery, beets, tomato, cabbage, mushrooms

### **Fruits - High K<sup>+</sup> = all citrus fruit and juice, bananas**

Avocado, papaya, banana, orange, dried fruits - apricots, raisins, dates, prunes, figs, melons - cantaloupe, honeydew, watermelon, apricots, kiwi, nectarines, mango, fruit cocktail, rhubarb, pear, peach, pineapple, grapefruit, plums, strawberries, raspberries, apple

### **Juices**

Orange, prune, grapefruit, pineapple, tomato, vegetable

### **Milk Products**

Malted milk

Ovaltine (made with milk)

## **E. HOW TO ADJUST YOUR DIURETIC DOSE**

Congestive heart failure is not a static (unchanging) condition. Heart failure may deteriorate for a variety of reasons. For instance: excessive salt or fluid intake, intercurrent illness such as flu or pneumonia, cardiac arrhythmias, anemia, medications which cause salt retention such as anti-inflammatory medications, episodes of angina, heart attacks etc.; all may worsen heart failure. Sometimes however, the patient with heart failure worsens for no apparent reason. The educated patient must know how to anticipate deterioration, and to know how to react to it in order to correct the deterioration before it becomes serious. Just as when steering a car, the heart failure patient must adjust to changes in their condition in order to stay on course. A little too wet and they become congested and short of breath. A little too dry and they become weak, fatigued and dizzy.

When your doctor examines your neck, he is looking at your veins to assess how much fluid is in the circulatory system. Although the patient cannot do this, paying attention to your condition, particularly how you feel, how much swelling is present at the ankles and your body weight can give a pretty good indication of your fluid status. A little bit of swelling of the ankles at the end of the day is normal and indicates sufficient fluid in the circulatory system to allow a weakened heart to pump normally. More than a trace of swelling at the ankles indicates fluid excess. This fluid may re-enter the central circulation when you lie down, awakening you with shortness of breath or forcing you to sleep on several pillows for comfort. Similarly if your weight goes up by more than 2-3 pounds (1.0 kg) in one day or by 5 pounds (2.5 kg) over a week, the body may be retaining too much fluid and worsening heart failure may ensue.

### **To monitor your own fluid status:**

1. Weigh yourself daily
2. Weigh yourself at the same time every day-before breakfast is best.
3. Use the same scale all the time
4. Wear the same amount of clothes when you weigh yourself
5. Empty your bladder before weighing
6. Record your weight on a daily record
7. The weight at which there is just a little bit of swelling in the ankles at the end of the day is your ideal weight-try and maintain it
8. When taking diuretics avoid drinking too much in the way of fluids, even if your mouth is dry and you feel thirsty. This could counter the effect of the diuretic and dilute the body's salts causing weakness and confusion.
9. You should drink no more than 2000 ml (8 glasses or cups) of fluid per day, or whatever amount is prescribed for you.
10. **If your weight goes up by more than 2-3 pounds (1.0 kg) in one day or by 5 pounds (2.5 kg) over a week adjust your diuretic according to the diuretic sliding scale or call your nurse or doctor.**

**Diuretic 1:**

Take extra furosemide according to following sliding scale.

Diuretic dose	Dosing frequency	Sliding scale adjustment
Furosemide 20 mg	AM daily	Extra 20 mg in PM
Furosemide 40 mg	AM daily	Extra 40 mg in PM
Furosemide 80 mg	AM daily	Extra 40 mg in PM. If needed increase to extra 80 mg in PM
Furosemide 20 mg	Twice daily	Extra 20 mg in AM
Furosemide 40 mg	Twice daily	Extra 40 mg in AM
Furosemide 80 mg	Twice daily	Extra 40 mg at noon. If needed increase to extra 80 mg at noon.
Cut back to usual diuretic dose as weight, swelling and symptoms permit		

**Diuretic 2:**

Some times one diuretic medication is insufficient to control fluid overload. A second diuretic is needed. This diuretic is usually taken in low dose and intermittently as required (PRN). Combining diuretics can produce a very potent effect resulting in excess dehydration. Only your physician should make adjustments of these diuretics.

Diuretic dose (mg)	Dosing frequency	Sliding scale adjustment
HCT* 12.5		
HCT 25		
* hydrochlorothiazide		
Indapamide 1.25		
Indapamide 2.5		
Indapamide 5.0		
Metalozone 1.25		
Metalozone 2.5		
Metalozone 5		
Spironolactone 12.5		
Spironolactone 25		
Spironolactone 50		
Dyazide		
Moduret		
Aldactazide 25		

## F. BETA BLOCKER TITRATION PROTOCOLS

○ Standard Protocol: Start Low and Go Slow: Follow-up Q 2 weeks

### \_\_\_ Bisoprolol:

1. Bisoprolol 1.25 mg OD X 2 weeks then
2. Bisoprolol 2.5 mg OD X 2 weeks then
3. Bisoprolol 5.0 mg OD X 2 weeks then
4. Titrate to 10 mg OD if HR, BP and HF allow.

### \_\_\_ Carvedilol:

1. Carvedilol 3.125 mg BID X 2 weeks then
2. Carvedilol 6.25 mg BID X 2 weeks then
3. Carvedilol 12.5 mg BID X 2 weeks then
4. Carvedilol 25 mg BID X 2 weeks then
5. Titrate to 50 mg BID if weight > 85 kg if HR, BP and HF allow.

### \_\_\_ Metoprolol:

1. Metoprolol 12.5 mg BID X 2 weeks then
2. Metoprolol 25 mg BID X 2 weeks then
3. Metoprolol 50 mg BID X 2 weeks then
4. Continue up-titration to 75 mg BID if HR, BP and HF allow.

### Adjusting recommendations - concomitant medications:

1. Dizziness
  - 1) ↓ diuretic
  - 2) ↓ β-blocker
2. Worsening HF
  - 1) ↑ diuretic
  - 2) ↓ β-blocker
  - 3) d/c β-blocker
3. Bradycardia < 50bpm
  - 1) ↓ β-blocker
  - 2) d/c β-blocker

○ Modified Protocol: Start Lower and Go Slower: Follow-up Q 4 weeks

— **Bisoprolol:**

1. Bisoprolol 1.25 mg EOD X 2 weeks then
2. Bisoprolol 1.25 mg OD X 2 weeks then
3. Bisoprolol 2.5 mg OD X 2 weeks then
4. Bisoprolol 5.0 mg OD X 2 weeks then
5. Titrate to 10 mg OD if HR, BP and HF allow.

— **Carvedilol:**

1. Carvedilol 3.125 mg OD X 1 week then
2. Carvedilol 3.125 mg BID X 1 week then
3. Carvedilol 3.125 mg TID X 1 week then
4. Carvedilol 6.25 mg BID X 2 weeks then
5. Carvedilol 6.25 mg TID X 2 weeks then
6. Carvedilol 12.5 mg BID X 2 weeks then
7. Carvedilol 12.5 mg TID X 2 weeks then
8. Carvedilol 25 mg BID then
9. Titrate to 50 mg BID if weight > 85 kg if HR, BP and HF allow.

— **Metoprolol:**

1. Metoprolol 12.5 mg OD X 2 weeks then
2. Metoprolol 12.5 mg BID X 2 weeks then
3. Metoprolol 12.5 mg TID X 2 weeks then
4. Metoprolol 25 mg BID X 4 weeks then
5. Metoprolol 25 mg TID X 4 weeks then
6. Metoprolol 50 mg BID X 4 weeks then
7. Continue up-titration to 75 mg BID if HR, BP and HF allow.

**Adjusting concomitant medications:**

1. Dizziness
  - 1) ↓ diuretic
  - 2) ↓ β-blocker
2. Worsening HF
  - 1) ↑ diuretic
  - 2) ↓ β-blocker
  - 3) d/c β-blocker
3. Bradycardia < 50bpm
  - 1) ↓ β-blocker
  - 2) d/c β-blocker







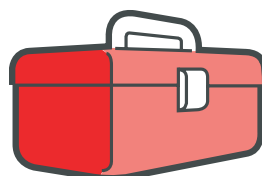


## H. Heart Failure Patient Education Tracking Checklist ■

Topic	Taught by	Date	Understood	Additional Questions/Needs
How the heart works				
What is CHF				
• causes				
• triggers				
• symptoms				
Symptoms of heart disease				
• angina				
• heart attack				
• arrhythmia				
Lifestyle changes/ Risk factors in HF				
• low salt diet				
• potassium replacement				
• exercise/activity				
• smoking cessation				
• hypertension Rx				
• diabetes Rx				
• cholesterolRx				
• depression Rx				
• inactivity				
• obesity				
• stress				
Exercise Rx				
• HR target				
• frequency/duration				
• type				

<b>Cardiac tests/procedures</b>				
• echo/Doppler				
• TEE				
• Stress testing				
• Holtermonitor				
• Stress nuclear testing				
• Gated nuclear angiogram				
• cardiac catheterization				
• angioplasty				
• bypass surgery				
• cardiac resynchronization therapy				
• AICD				
<b>Medications Rx</b>				
• digoxin				
• diuretics				
• ACE inhibitor				
• ARB's				
• nitrate/hydralazine				
• beta blocker				
• calcium channel blocker				
• nitroglycerin				
• anti-arrhythmics				
• aspirin				
• Plavix				
• anti-coagulants				
<b>HF self monitoring</b>				
• Do's & Don'ts				
• symptoms				
• weight				
• edema				
• HR				
• diuretic adjustment				
• beta blocker adjustment				
• ACE/ARB targets				

Publication of this Guide has been made possible  
by unrestricted grants from:



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